

REMARKS/ARGUMENTS

Claims 1-57 are pending in this application and have not been changed in the instant Amendment. Claims 16-57 were allowed. Claims 1-15 were rejected. Reconsideration of these rejections is respectfully requested.

Applicants note with appreciation that claims 16-57 have been allowed.

Claims Rejected

Claims 1, 2, 4, 5, 12 and 13 stand rejected under 35 U.S.C. § 103(a) as allegedly being obvious over Snyder et al. (U.S. Patent No. 5,870,097). Claim 15 also appears to stand rejected under 35 U.S.C. § 103(a) as allegedly being obvious over Snyder et al. Additionally, claims 3, 6, 7 and 8 stand rejected under 35 U.S.C. § 103(a) as allegedly being obvious over Snyder et al. in view of Jenkins (U.S. Patent No. 6,111,582). Claim 9 also appears to stand rejected under 35 U.S.C. § 103(a) as allegedly being obvious over Snyder et al. in view of Jenkins. Moreover, claims 10, 11 and 14 stand rejected under 35 U.S.C. § 103(a) as allegedly being obvious over Snyder et al. in view of Foran et al. (U.S. Patent No. 5,742,749). Applicants respectfully traverse all the Examiner's rejections.

A. Claim 1

Snyder fails to disclose or suggest all limitations of claim 1. More particularly, claim 1 recites "evaluating said visibility function at said map locations and depths to yield a fractional light contribution from said light source." (emphasis added). Snyder fails to disclose or suggest these claim limitations.

In Office Action, the Examiner conceded that Snyder does not teach evaluating the visibility function at the map locations and depths to yield a fractional light. (Office Action mailed Oct. 19, 2004, page 3). But the Examiner asserted that it would have been obvious to one of ordinary skill in the art at the time the invention was made to utilize the Snyder's teaching for computing the visibility function of the shadow depth map because it would improve rendering shadow, support more sophisticated shadow map filtering, and enables the rendering system to

achieve smoother transitions between shadowed and un-shadowed portions of an image. (Office Action mailed Oct. 19, 2004, page 4).

To support the above assertion, the Examiner cited Snyder, col. 5, lines 27-29. (Office Action mailed Oct. 19, 2004, page 4). Snyder recites “[t]he support for more sophisticated shadow map filtering enables the rendering system to achieve smoother transitions between shadowed and un-shadowed portions of an image, even for lower resolution shadow maps.” (Snyder, col. 5, lines 27-30). Hence Snyder uses a more sophisticated shadow map filtering, not a visibility function as claimed, to enable a rendering system to achieve smoother transitions between shadowed and un-shadowed portions of an image. Snyder relies on a filtering process, not a visibility function as claimed, to generate a fractional light contribution.

Specifically, Snyder recites the following:

The invention relates to graphics rendering systems that perform shadowing in at least two rendering passes, including a pass to compute a shadow depth map, and another pass to apply the shadow depth map to an image illuminated by a light source. One aspect of the invention relates to a method for dynamically computing a shadow depth map based on a bias constant and the two closest geometric primitives for each element in the shadow depth map. Another aspect of the invention relates to how the shadow map is filtered as it is applied to an image. (Snyder, col. 4, lines 29-39).

Computing the shadow depth map in the manner summarized above alleviates the problem of having light “leak through” occluding geometry as well as having a shadow eliminated improperly due to an excessive bias. The use of a bias constant to clamp the depth value added to the front-most z value facilitates the re-use of the shadow depth map for subsequent frames of animation. (Snyder, col. 5, lines 20-26).

Snyder appears to teach away from a visibility function that is able to generate a fractional light contribution. Snyder improves a shadow depth map, not with a visibility function as claimed, but by “dynamically computing a shadow depth map based on a bias constant and the two closest geometric primitives for each element in the shadow depth map.” (Snyder, col. 4, lines 34-37).

Snyder also emphasizes such improvement is one of two aspects of the invention with significant advantages. (Snyder, col. 4, lines 34-39 and col. 5, lines 20-26).

Accordingly, claim 1 is asserted to be allowable for at least the above reasons.

B. Remaining Claims

In light of the above, it is asserted that claims 2-15 are allowable for substantially the same reason as claim 1, and more particularly for the specific features they recite.

Double Patenting

Claims 1-15 stand rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1 and 10 of U.S. Patent No. 6,760,024. U.S. Patent No. 6,760,024 was issued from U.S. Application Serial No. 09/619,064, and the above identified application is a continuation application of the same U.S. Application Serial No. 09/619,064. As suggested by the Examiner, these rejections can be overcome by filing a terminal disclaimer. In response, applicants will file a terminal disclaimer when other issues of patentability related to the above identified application are resolved.

CONCLUSION

In view of the foregoing, Applicants believe all claims now pending in this Application are in condition for allowance. The issuance of a formal Notice of Allowance at an early date is respectfully requested.

If the Examiner believes a telephone conference would expedite prosecution of this application, please telephone the undersigned at 650-326-2400.

Appl. No. 10/686,551
Amdt. dated February 18, 2005
Reply to Office Action of October 19, 2004

PATENT

Respectfully submitted,

A handwritten signature in black ink that reads "Daniel Mao". The signature is written in a cursive style with a stylized "M" and "ao".

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